

1 REMARKS

2 Status of the Claims

3 Claims 1-8 and 10-58 remain pending in the present application. Applicants have canceled
4 Claim 9 and amended Claims 1, 20, and 43 to more clearly distinguish over the art cited by the
5 Examiner. In addition, Claims 10, 14, 22, 29, 33, 48, 51, 55, and 56 have been amended to correct
6 minor typographical errors.

7 Claims Rejected under 35 USC § 102(e)

8 The Examiner has rejected Claims 1-5, 8-24, 27-40, 42-45, 47-56, and 58 as anticipated by
9 U.S. Patent No. 6,485,413 (Boppart et al., hereinafter referred to as "Boppart"). Boppart is directed
10 to carrying out Optical Coherence Tomography (OCT). The Examiner asserts that specific portions
11 of Boppart disclose each of the elements recited in applicants' above-listed rejected claims. In
12 consideration of this rejection, applicants have amended the independent claims in this application.
13 These claims now clearly patentably distinguish over Boppart for the reasons discussed below.

14 In the interest of reducing the complexity of the issues for the Examiner to consider in this
15 response, the following discussion focuses on independent Claims 1, 20, and 43. The
16 patentability of each remaining dependent claim is not necessarily separately addressed in detail.
17 However, applicants' decision not to discuss the differences between the cited art and each
18 dependent claim should not be considered as an admission that applicants concur with the
19 Examiner's conclusion that these dependent claims are not patentable over the disclosure in the
20 cited references. Similarly, applicants' decision not to discuss differences between the cited art
21 and every claim element, or every comment made by the Examiner, should not be considered as
22 an admission that applicants concur with the Examiner's interpretation and assertions regarding
23 those claims. Indeed, applicants believe that all of the dependent claims patentably distinguish
24 over the references cited. Moreover, a specific traverse of the rejection of each dependent claim
25 is not required, since dependent claims are patentable for at least the same reasons as the
26 independent claims from which the dependent claims ultimately depend.

27 Rejection of Claim 1

28 To facilitate discussion, subparagraph (c) of Claim 1 (as currently amended) is reproduced
29 below.
30

1 (c) a cantilever comprising a fixed end and a free end, the fixed end
2 remaining fixed to the substrate and the free end extending freely relative to the
3 substrate, enabling the free end to deflect in regard to the limited region of interest to
4 scan light onto an image plane to create an image, wherein the cantilever is configured
5 as one of:

6 (i) a waveguide that conveys light from the light source
7 within the cantilever, when scanning the light onto the image plane to create the image;
8 and

9 (ii) a moving carrier for the light source that emits the light,
10 the light source being mounted on the free end of the cantilever and moving when
11 scanning the light emitted by the light source onto the image plane to create the image;

12 Claim 1 is directed to apparatus for displaying of an image in a limited region of interest.
13 This claim has been amended to more clearly recite details of the cantilever used for scanning light
14 onto the limited region of interest, and recite details neither taught nor suggested by Boppart. In her
15 rejection of Claim 1, the Examiner has referred to Col. 11, lines 59 – 60 and Figure 4b of Boppart as
16 teaching a cantilever that serves as a waveguide and is driven by a piezoelectric actuator. The
17 cantilever embodiment of Figure 4b in Boppart shows a cantilever 74 having an end on which is
18 affixed a GRIN lens 92 that is coupled to a single mode optical fiber 58. However, in
19 subparagraph (c) as amended, applicants now recite that the cantilever is configured as either: *a*
20 *waveguide that conveys light from a light source within the cantilever, when scanning the light*
21 *onto an image plane to create an image*, or as *a moving carrier for the light source that emits the*
22 *light, the light source being mounted on the free end of the cantilever and moving when scanning*
23 *the light emitted by the light source onto the image plane to create image*. The Examiner is directed
24 to applicants' FIGURE 4 and the corresponding text in applicants' specification that describes an
25 exemplary embodiment using the cantilever, which serves as a waveguide, to convey light. The light
26 is actually conveyed within the cantilever and not in an attached optical fiber. The alternative recited
27 in subparagraph (c) of Claim 1 is shown in applicants' FIGURE 6B and described by the
28 corresponding text, which indicates that a laser diode 272 is attached to free end 216 of
29 cantilever 212. In contrast, Boppart fails to show or discuss any corresponding equivalents.
30 Nowhere does Boppart teach or suggest that a cantilever serves as a waveguide within which light is
conveyed from a light source to create an image on an image plane. There is also no teaching or
suggestion in Boppart of using a cantilever having a free end attached to a light source for scanning
an image plane to create an image.

1 The Examiner is also cautioned to avoid mixing the teachings related to different
2 embodiments of Boppart. For example, the approach shown by Boppart in the embodiment of Figure
3 4b should not be mixed with the very different embodiment of Figure 4c. The Examiner appears to
4 be relying upon this unrelated embodiment of Figure 4c, since in paragraph 3 of the Office Action,
5 the Examiner states that "the optical fiber is attached to the cantilever (figure 4c, elements 48 and 94)
6 wherein the cantilever serves as a waveguide." However, Figure 4c (and other embodiments taught
7 by Boppart) do not use a cantilever and are therefore not relevant to applicants' Claim 1.

8 Furthermore, subparagraph (e) of applicants' Claim 1 recites "a position sensor employed for
9 detecting a position of the free end of the cantilever, for producing a signal used in controlling the
10 actuator to cause the cantilever to move in the desired motion." The Examiner indicates that col. 13,
11 lines 34-38 of Boppart teach a position sensor, but applicants respectfully disagree. The referenced
12 portion of Boppart refers to Figures 5a and 5b, which are included to show how the entire device that
13 includes the fiber/lens unit is translated. Col. 13, lines 31 – 38 of the reference recite:

14 The fiber/lens unit 63 is fixed within the forward-imaging device, but the entire device
15 is translated in the transverse direction to obtain the cross-sectional image. While the
16 device is stationary, single axial scans of the same location are repeatedly acquired.
17 When the device is translated, this motion is sensed by a sensing mechanism which
18 instructs the control computer at which position to place the axial scan within the
19 image.

20 Thus, it is clear that Boppart teaches use of a secondary imaging fiber bundle 120 (Figure 5a),
21 and a position sensing rolling mechanism 125 (Figure 5b) for *sensing the motion of the entire unit*
22 *as the device is translated along an axis*. In contrast to the recitation of subparagraph (e) of Claim 1,
23 Boppart clearly does NOT teach or suggest a position sensor that is used for detecting the position of
24 the free end of a cantilever, or which produces a signal that is used to control an actuator that drives a
25 cantilever to deflect, so that the cantilever moves in a desired motion.

26 In consideration of the substantial differences that exist between the teaching of Boppart and
27 the apparatus recited in Claim 1, as noted above, it is apparent that Claim 1 is clearly patentable over
28 this reference. Similarly, Claims 2-8 and 10-19 are also patentable over the cited Boppart reference,
29 at least for the same reasons as discussed above in regard to Claim 1.
30

1 Rejection of Claim 20

2 Claim 20 is directed to apparatus for use either for far-field image acquisition or for
3 displaying an image, in regard to a limited region of interest. Applicants have amended this claim to
4 make it clear that it is further directed to apparatus that is configured as a micro-electro-mechanical
5 system (MEMS). In contrast, the Boppart reference addresses apparatus that is used for OCT and
6 does not teach or suggest that the apparatus disclosed might be configured as a MEMS or use any
7 component of the type that might be viewed as part of a MEMS or device.

8 In addition, applicants have amended subparagraph (c) of Claim 20 to recite:

9 a cantilever comprising at least one of a thin film layer and a thick film layer and
10 having a fixed end and a free end, the fixed end remaining fixed to the substrate upon
11 which the cantilever was originally formed and the free end extending freely beyond
12 where the substrate has been removed from supporting the cantilever, enabling the free
end to deflect relative to the substrate in the limited region of interest;

13 Thus, applicants' Claim 20 (as amended above) now indicates that the cantilever comprises at
14 least one of a thin film layer and a thick film layer. Support for this amendment is provided in the
15 specification, for example, at page 21, lines 16 – 28. In contrast, Boppart does not teach or suggest
16 the use of a cantilever that includes a layer of either a thick or a thin film. It should be understood
17 that the MEMS configuration enables an extremely compact device to be fabricated that is useful for
18 either far-field imaging or for display an image. The OCT apparatus disclosed by Boppart does not
19 recognize the advantage of employing a MEMS and applicants' claimed apparatus would not be
20 obvious in view of what is taught by Boppart and the other art of record. Since Boppart does not
21 employ or suggest using a MEMS configuration, it is not surprising the Boppart does not teach or
22 suggest a cantilever comprising at least one of a thin film layer and a thick film layer.

23 Further, as noted above in regard to applicants' traverse of the rejection of Claim 1, there is no
24 teaching or suggestion in Boppart of "a position sensor employed for detecting a position of the free
25 end of the cantilever, for producing a signal used in controlling the actuator to cause the cantilever to
26 move in the desired motion," as recited in subparagraph (e) of Claim 20. Boppart only senses
27 translational motion of the entire OCT unit, as explained above.

28 Accordingly, it is apparent that Claim 20 (as amended) distinguishes over Boppart. Similarly,
29 Claims 21 – 42, which depend from Claim 20 and inherently include all that is recited therein, are
30 patentable over the art of record for at least the same reasons as Claim 20.

1 Rejection of Claim 43

2 As amended, Claim 43 is directed to a method for enabling either a far-field image acquisition
3 or a display of an image, in regard to a limited region of interest, using a MEMS. Subparagraphs (a)
4 and (b) of Claim 43 respectively recite "forming a cantilever on a substrate", and "removing a portion
5 of the substrate underlying the cantilever." Boppart fails to teach any corresponding step for forming
6 a cantilever. Details of the steps recited in this claim are set forth in applicants' specification at
7 page 21, line 16 through page 23, line 18, in the section entitled "Cantilever."

8 In addition, subparagraph (e) recites "detecting a position of the free end of the cantilever,
9 producing a signal indicative of the position for use in controlling the cantilever to move in the
10 desired motion." Applicants have already pointed out that Boppart fails to teach or suggest any
11 equivalent step.

12 Since applicants' method Claim 43 recites steps not disclosed or suggested in the cited
13 reference, it should be apparent that this claim is patentable over Boppart and the other cited art.
14 Similarly, Claims 44 – 58 are also patentable for at least the same reasons as Claim 43, since they all
15 ultimately depend from and inherently include the recitation of that claim.

16 Claims Rejected under 35 USC § 103(a)

17 The Examiner has rejected Claims 6, 7, 25, 26, 41, 46, and 57 as being unpatentable over
18 Boppart in view of U.S. Patent No. 5,209,117 (Bennett). The Examiner acknowledges that Boppart
19 fails to disclose a tapered cantilever, but relies upon col. 3, lines 4-5 of Bennett for teaching such a
20 cantilever. Applicants respectfully disagree with this rejection for the following reasons.

21 Bennett is directed to a sensor for detecting movement based upon the displacement of a mass
22 supported by a tapered cantilevered beam. Accordingly, there is no teaching or suggestion in Bennett
23 of a cantilever for use in displaying an image or imaging a region. Accordingly, one of ordinary skill
24 in the art would not be lead (i.e., find it obvious) to modify the cantilever of Boppart to have a
25 tapered shape as taught by Bennett, even though Bennett points out the advantages of such a tapered
26 cantilever *for use in a motion sensor*. The advantages of a tapered cantilever discussed by Bennett
27 in col. 3, lines 4-5 are specific to a cantilever that suspends a mass in a motion sensor and there is no
28 reason why one of ordinary skill would understand that these advantages might be applicable to a
29 cantilever used for displaying an image or imaging a region. Accordingly, it appears that there is no
30 justification for making the combination of these two references as indicated by the Examiner.

1 In any case, applicants have already noted that each of these dependent claims is respectively
2 patentable over Boppart for the reasons discussed above in connection with the three independent
3 claims in this case.

4 Based upon the preceding Remarks, it should be clear that all claims in the present application
5 are patentable over the art cited. This case should thus be passed to issue without further delay. In
6 the event that any question remains, the Examiner is asked to telephone applicants' attorney at the
7 number listed below.

8 Respectfully submitted,

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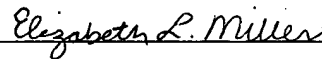
12 Ronald M. Anderson
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16 MAILING CERTIFICATE

17 I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed
18 envelope as first class mail with postage thereon fully prepaid addressed to: Commissioner for Patents,
Alexandria, VA 22313-1450, on April 19, 2006.

19 Date: April 19, 2006


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